

THE OFFICE ACTION

In the Office Action issued on December 1, 2006, the Examiner rejected claims 1-7 under 35 U.S.C. §102(e) as being unpatentable over U.S. Patent No. 6,864,931 to Kumar et al. ("Kumar").

REMARKS

Applicants have carefully considered the Office Action. Applicants respectfully request reconsideration of the application in light of the following comments.

The Examiner's objection is that the present invention is anticipated by Kumar, which also discloses a diffraction grating constructed using a liquid crystal and pre-polymer formulation. While there may be superficial similarities between Kumar and the present invention, the essential physical mechanism of the grating structure and how it is formed is inherently different.

The common steps in the construction of both Kumar and the present invention, as pointed out by the examiner, i.e. "first and second cell wall", "electrodes", "polymeric network" and "power source" are common in an enormous variety of liquid crystal/polymer technologies, and are not novel in and of themselves in either the present invention or Kumar (or many others). The novelty in Kumar, as well as the present invention, is the manner, the order, the precise details in which these construction steps and elements are applied, and the precise physical and chemical properties of the formulations, the nature of the UV light source, etc.

Both inventions teach construction of a diffraction grating, which can only be possible when a structure possesses optical properties which are periodic in space, that is, the same structure repeats itself in space with a well defined length, like a traditional grating comprised of evenly spaced lines engraved into glass.

However, there are at least two fundamental differences between Kumar and the present invention: namely i) the manner in which the spatially periodic optical structure is formed, and the ii) the necessity for a phase-separation process required by Kumar, but not by the present invention.

With regard to item i) above, in Kumar, two methods are taught to form the grating (Column 3, lines 15-17), "using a photomask" and "a collimated beam of

light". In the present invention, the grating structure forms *spontaneously* upon the application of an electric potential difference having appropriate amplitude and frequency. That is, in Kumar, the physical properties of the formed grating are determined by the photomask or the collimated beam of light, whereas in the present invention, they are determined by the convective roll structure which spontaneously arises.

Furthermore, and perhaps more importantly, Kumar fails to disclose or suggest the formation or presence of the claimed convective rolls. In this respect, the Examiner has erroneously assumed that the "microlens (90)" in Kumar is somehow similar to the liquid crystal convective rolls in the present invention. The differences are enormous. Most notably, in Kumar's microlens, there is no motion of the liquid crystal, whereas in our convective rolls (3), the liquid crystal is moving and the liquid crystal directors within the rolls can be altered by application of an electric field (page 8, lines 13-16).

Secondly, and with regard to item ii), in Kumar, the mixture of liquid crystals and prepolymer forms into the desired structure through the phase separation process (Column 2, lines 63-64). During this process, the initial ingredients separate from themselves in a manner analogous to oil and vinegar separating in salad dressing. The two separate phases (liquid crystal rich-polymer poor and polymer rich-liquid crystal poor) remain separate after the polymerization process. The present invention relies on no such separation, in contrast, the pre-polymer is present in very dilute amounts and during the polymerization process, the pre-polymers bond with each other chemically throughout the liquid crystal.

Each of these differences is profound, and the two inventions teach entirely different approaches towards building a device. The approach used in Kumar would be wholly inapplicable in building an electro-convective diffractive device, and vice versa.

CONCLUSION

In view of the foregoing comments, Applicants submit that claims 1-7 are in condition for allowance. Applicants respectfully request early notification of such allowance. Should any issues remain unresolved, the Examiner is encouraged to contact the undersigned to attempt to resolve any such issues.

If any fee is due in conjunction with the filing of this response, Applicants authorize deduction of that fee from Deposit Account 06-0308.

Respectfully submitted,

FAY SHARPE LLP

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Joseph E. Waters, Reg. No. 50,427
1100 Superior Avenue
Seventh Floor
Cleveland, OH 44114-2518
216/861-5582

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